

FORM PTO-1390 (Modified)  
(REV 11-98)

U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

ATTORNEY'S DOCKET NUMBER

TRANSMITTAL LETTER TO THE UNITED STATES  
DESIGNATED/ELECTED OFFICE (DO/EO/US)  
CONCERNING A FILING UNDER 35 U.S.C. 371

204252US2PCT

U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR

09/786333

INTERNATIONAL APPLICATION NO.  
PCT/FR99/02111INTERNATIONAL FILING DATE  
03 September 1999PRIORITY DATE CLAIMED  
08 September 1998

TITLE OF INVENTION

VIDEO/FILM CAMERA

APPLICANT(S) FOR DO/EO/US

Patrick DEFAY

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☒ This is an express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1).
4. ☒ A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.
5. ☒ A copy of the International Application as filed (35 U.S.C. 371 (c) (2))
  - a. ☐ is transmitted herewith (required only if not transmitted by the International Bureau).
  - b. ☒ has been transmitted by the International Bureau.
  - c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☒ A translation of the International Application into English (35 U.S.C. 371(c)(2)).
7. ☒ A copy of the International Search Report (PCT/ISA/210).
8. ☒ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371 (c)(3))
  - a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau).
  - b. ☐ have been transmitted by the International Bureau.
  - c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
  - d. ☒ have not been made and will not be made.
9. ☐ A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
10. ☒ An oath or declaration of the inventor(s) (35 U.S.C. 371 (c)(4)).
11. ☒ A copy of the International Preliminary Examination Report (PCT/IPEA/409).
12. ☒ A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371 (c)(5)).

## Items 13 to 20 below concern document(s) or information included:

13. ☐ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
14. ☐ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
15. ☒ A **FIRST** preliminary amendment.
16. ☐ A **SECOND** or **SUBSEQUENT** preliminary amendment.
17. ☐ A substitute specification.
18. ☐ A change of power of attorney and/or address letter.
19. ☐ Certificate of Mailing by Express Mail
20. ☒ Other items or information:

Request for Consideration of Documents Cited in International Search Report

Notice of Priority

PCT/IB/304

PCT/IB/308

Drawings (2 Sheets)

Amended Sheets (Pages 1 and 8)

U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR 1.53) <div style="font-size: 2em; font-weight: bold; margin-top: 5px;">09/786333</div>		INTERNATIONAL APPLICATION NO <div style="font-weight: bold; margin-top: 5px;">PCT/FR99/02111</div>		ATTORNEY'S DOCKET NUMBER <div style="font-weight: bold; margin-top: 5px;">204252US2PCT</div>	
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21. The following fees are submitted.. <b>BASIC NATIONAL FEE ( 37 CFR 1.492 (a) (1) - (5)) :</b> <div style="margin-top: 5px;"> <input type="checkbox"/> Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO ..... \$1,000.00  <input checked="" type="checkbox"/> International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO ..... \$860.00  <input type="checkbox"/> International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO ..... \$710.00  <input type="checkbox"/> International preliminary examination fee paid to USPTO (37 CFR 1.482) but all claims did not satisfy provisions of PCT Article 33(1)-(4) ..... \$690.00  <input type="checkbox"/> International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(1)-(4) ..... \$100.00         </div> <div style="text-align: right; margin-top: 5px;"> <b>ENTER APPROPRIATE BASIC FEE AMOUNT =</b>  <div style="float: right; font-weight: bold;">\$860.00</div> </div> <div style="margin-top: 5px;">           Surcharge of \$130.00 for furnishing the oath or declaration later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492 (e)).  <div style="text-align: right; font-weight: bold;">\$0.00</div> </div> <table border="1" style="width:100%; border-collapse: collapse; margin-top: 5px;"> <tr> <th style="width:15%;">CLAIMS</th> <th style="width:20%;">NUMBER FILED</th> <th style="width:20%;">NUMBER EXTRA</th> <th style="width:10%;">RATE</th> <th style="width:15%;"></th> <th style="width:10%;"></th> </tr> <tr> <td>Total claims</td> <td>10 - 20 =</td> <td>0</td> <td>x \$18.00</td> <td></td> <td style="text-align: right; font-weight: bold;">\$0.00</td> </tr> <tr> <td>Independent claims</td> <td>1 - 3 =</td> <td>0</td> <td>x \$80.00</td> <td></td> <td style="text-align: right; font-weight: bold;">\$0.00</td> </tr> <tr> <td colspan="5">Multiple Dependent Claims (check if applicable). <input type="checkbox"/></td> <td style="text-align: right; font-weight: bold;">\$0.00</td> </tr> <tr> <td colspan="5" style="text-align: right;"><b>TOTAL OF ABOVE CALCULATIONS =</b></td> <td style="text-align: right; font-weight: bold;">\$860.00</td> </tr> </table> <div style="margin-top: 5px;">           Reduction of 1/2 for filing by small entity, if applicable. Verified Small Entity Statement must also be filed (Note 37 CFR 1.9, 1.27, 1.28) (check if applicable). <input type="checkbox"/>  <div style="text-align: right; font-weight: bold;">\$0.00</div> </div> <div style="text-align: right; margin-top: 5px;"> <b>SUBTOTAL =</b>  <div style="float: right; font-weight: bold;">\$860.00</div> </div> <div style="margin-top: 5px;">           Processing fee of \$130.00 for furnishing the English translation later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492 (f)).  <div style="text-align: right; font-weight: bold;">\$0.00</div> </div> <div style="text-align: right; margin-top: 5px;"> <b>TOTAL NATIONAL FEE =</b>  <div style="float: right; font-weight: bold;">\$860.00</div> </div> <div style="margin-top: 5px;">           Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31) (check if applicable). <input type="checkbox"/>  <div style="text-align: right; font-weight: bold;">\$0.00</div> </div> <div style="text-align: right; margin-top: 5px;"> <b>TOTAL FEES ENCLOSED =</b>  <div style="float: right; font-weight: bold;">\$860.00</div> </div> <table border="1" style="width:100%; border-collapse: collapse; margin-top: 5px;"> <tr> <td style="width:70%;"></td> <td style="width:10%; text-align: right; font-weight: bold;">Amount to be:</td> <td style="width:20%;"></td> </tr> <tr> <td></td> <td style="text-align: right; font-weight: bold;">refunded</td> <td style="text-align: right;">\$</td> </tr> <tr> <td></td> <td style="text-align: right; font-weight: bold;">charged</td> <td style="text-align: right;">\$</td> </tr> </table>				CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE			Total claims	10 - 20 =	0	x \$18.00		\$0.00	Independent claims	1 - 3 =	0	x \$80.00		\$0.00	Multiple Dependent Claims (check if applicable). <input type="checkbox"/>					\$0.00	<b>TOTAL OF ABOVE CALCULATIONS =</b>					\$860.00		Amount to be:			refunded	\$		charged	\$	<b>CALCULATIONS PTO USE ONLY</b> <div style="height: 150px; border: 1px solid black;"></div>	
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☒ A check in the amount of **\$860.00** to cover the above fees is enclosed.  
  
☐ Please charge my Deposit Account No. \_\_\_\_\_ in the amount of \_\_\_\_\_ to cover the above fees.  
 A duplicate copy of this sheet is enclosed.  
  
☒ The Commissioner is hereby authorized to charge any fees which may be required, or credit any overpayment to Deposit Account No. **15-0030** A duplicate copy of this sheet is enclosed.

**NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.**

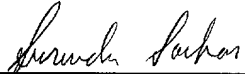
SEND ALL CORRESPONDENCE TO:

22850

**Surinder Sachar**  
**Registration No. 34,423**

  
 SIGNATURE

**Marvin J. Spivak**  
 NAME

**24,913**  
 REGISTRATION NUMBER

March 8 2001  
 DATE

THE FOLLOWING IS THE ENGLISH TRANSLATION OF THE  
ANNEXES TO THE INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT: AMENDED SHEETS (Pages 1 & 8).

09/786333

JC02 Rec'd PCT/PTO 08 MAR 2001

204252US

IN THE UNITED STATES PATENT & TRADEMARK OFFICE

IN RE APPLICATION OF: :

PATRICK DEFAY :

SERIAL NO: NEW U.S. PCT APPLN. : ATTN: APPLICATION BRANCH  
(Based on PCT/FR99/02111)

FILED: HEREWITH :

FOR: VIDEO/FILM CAMERA

PRELIMINARY AMENDMENT

ASSISTANT COMMISSIONER FOR PATENTS  
WASHINGTON, D.C. 20231

SIR:

Prior to a first examination on the merits, please amend the above-identified  
application as follows:

IN THE CLAIMS

Please cancel Claims 1-10 without prejudice.

Please add new Claims 11-20 as follows:

--11. (New) Camera having an optical axis and comprising:

a shutter;

an objective focal plane;

an adapter;

a spectral splitter of light into three components;

three photoelectric-effect sensors, each light component being focused on a different sensor;

the object focal plane being common to all the light components, and the adapter matching the objective focal plane with the focal planes of the sensors;

an objective support that is designed to receive an objective and is located upline from the shutter;

an optical viewfinder, outside the field of the sensors, located off the optical axis; in that the optical paths between the input of the spectral splitter and the sensors are different for the three light components;

and in that shutter is reflecting, letting light pass through, in its open position, towards the objective focal plane and orienting the light, in its closed position, towards the viewfinder.

12. (New) Camera according to claim 11, wherein the camera comprises at least one mode in which the shutter periodically switches between the closed and the open positions and in that its switching period is smaller than the duration of the retinal persistence.

13. (New) Camera according to claim 11, wherein the shutter comprises at least one rotational element comprising at least one mirror part corresponding to its closed position and at least one aperture part corresponding to its open position.

14. (New) Camera according to claim 13, wherein the camera comprises an automatic control device for the rotative element at a speed of rotation proportional to the frequency of a signal given by the processing means to the automatic control device, the signal being a synchronization signal for the reading of the sensors by the processing means, and in that the camera comprises a sensor of the position of the rotative element, the position

sensor and the automatic control device enabling the rotative element to be phase-shifted with respect to the synchronization signal.

15. (New) Camera according to claim 14, wherein the sensors are frame transfer sensors.

16. (New) Camera according to claim 13, wherein the shutter comprises three modes that can be selected by the user including: a viewfinder mode corresponding to a fixed rotative element that always has a mirror part that intersects the optical axis; a video mode corresponding to a rotative element that always has an aperture part that intersects the optical axis; and a combined mode corresponding to the rotative element in rotation.

17. (New) Camera according to claim 13, wherein rotative element comprises at least two mirror parts and at least two aperture parts, and in that, in the vicinity of the optical axis, the mirror parts all cover a first angular sector that is substantially identical and the aperture parts all cover a second angular sector that is substantially identical.

18. (New) Camera according to claim 17, wherein the shutter comprises at least two rotative elements having a same axis of rotation, that are superimposed and can be offset by an angular offset such that the mirror parts of rotative elements overlap at least partially.

19. (New) Camera according to claim 18, wherein the offset can be selected by the user.

20. (New) Camera according to claim 11, wherein the camera comprises a screen to view the synthesis of the different light components after their passage into the processing means.--

### IN THE ABSTRACT

Please delete the original Abstract sheet page 11 in its entirety and insert therefor:

#### --ABSTRACT OF THE DISCLOSURE

A camera having an optical axis and including an objective support designed to receive an objective. A reflecting shutter lets light pass through, in its open position, towards an objective focal plane and orients the light, in its closed position, towards a viewfinder. An objective focal plane is common to all the light components of the light coming from the observed scene. An adapter matches the objective focal plane with the focal planes of the sensors. A spectral splitter splits light into three light components. Three photoelectric-effect sensors are provided, and each light component is focused on a different sensor. The optical paths between the input of the spectral splitter and the sensors is different for the three light components. The camera also including electronics for the processing of the information coming from the sensors, and an optical viewfinder, outside the field of the sensors, located off the optical axis.--

### REMARKS

Favorable consideration of this application, as presently amended, is respectfully requested.

The present preliminary amendment is submitted to place the above-identified application in more proper format under United States practice. By the present preliminary amendment original Claims 1-10 have been cancelled and new Claims 11-20 are presented for examination. The submission of new Claims 11-20 is not deemed to raise any issues of new matter as those claims are believed to be self-evident from original Claims 1-10. A new

Abstract believed to be in more proper format under United States practice is also submitted herewith.

The present application is believed to be in condition for a full and thorough examination on the merits. An early and favorable consideration of the present application is hereby respectfully requested.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,  
MAIER & NEUSTADT, P.C.



Gregory J. Maier  
Registration No. 25,599  
Attorney of Record  
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## VIDEO/FILM CAMERA

5                   The invention relates to the field of cameras.

                  The American patent US 4797734 describes a camera comprising a shutter with an exposure time by which it is possible to photograph very fast-moving objects

10                  To obtain the best possible shots, it is important for the user to frame his image properly throughout the shooting.

                  The German utility model DE U 90 13698 describes a camera with three optical channels: a film channel, a viewfinder channel and a photoelectric-effect sensor channel, the light being distributed between the different optical channels by means of a reflecting shutter and a semi-reflecting plate.

15                  In the prior art, there are video cameras with an electronic viewfinder located downline from photoelectric-effect sensors. Now, these sensors usually have a field that is the same as the useful field recorded in the camera. In this case, it becomes impossible to have access to a view outside the field of these sensors. This off-field view would enable the user to anticipate obstacles before they appear in the useful field of the observed scene.

20                  For this purpose, the invention uses an optical viewfinder placed in that part of the camera which is located upline from the sensors.

                  According to the invention, there is provided a camera according to claim 1.

30                  According to a preferred embodiment of the invention, there is provided a shutter comprising a rotational element comprising at least one mirror part corresponding to its closed position and at least one aperture part corresponding to its open position.

35                  The invention will be understood more clearly and other features and advantages shall appear from the following description and the appended drawings, given by way of non-restrictive examples, of which:

- Figure 1 gives a schematic view of the architecture of a camera according to the invention,

- Figure 2 gives a schematic view of an embodiment of a shutter according to the invention along the sectional plane AA of Figure 1,

5        - Figure 3 gives a schematic view of another embodiment of a shutter according to the invention along the sectional plane AA of Figure 1.

Figure 1 gives a schematic view of the architecture of a camera according to the invention.

10        The camera has an optical axis 14 shown in dots and dashes. The path of the light rays is shown by means of solid-line arrows while the direction of the arrows indicates the direction of propagation of the rays.

15        The camera has an objective support 1 designed to receive an objective 15 shown in dashes. Downline from the objective support 1, there is an objective focal plane 4 that corresponds to the focal plane of the objective 15 which will be used by the camera. This objective focal plane 4 is common for the different spectral components of the light coming from the observed scene. The camera is preferably designed to be used with a category comprising several objectives having the same extension, namely the distance  $d$  between the objective support 1 and the objective focal plane 4. This distance then remains the same for all objectives of this category. These objectives will preferably correspond to one and the same format, for example the Super 16 mm format. These objectives may also correspond to other formats such as for example the 35 mm format.

25        Between the objective support 1 and the objective focal plane 4, there is a shutter 2. In the open position, the shutter 2 lets through light, coming from the observed scene through an objective 15 mounted in the camera, towards the objective focal plane 4. In the closed position, the shutter 2 is reflective and reflects the same light by orienting it towards an optical viewfinder 3. Preferably, the camera has at least one mode in which the switching between the open position and the closed position is periodic, the switching period being smaller than the duration of the retinal persistence. The smaller this switching period with respect to the duration of retinal persistence, the greater is the visual comfort to the user at the optical viewfinder 3. The shutter 2 preferably has a rotative element 20 comprising at least one mirror part corresponding to its closed position and at least one

35

aperture part corresponding to its open position. The rotative element 20 is advantageously mounted on a rotational axis 27 as in Figure 1. The shutter 2 shall be described in detail further below with reference to Figures 2 and 3.

The optical viewfinder 3 is located off the optical axis 14. It therefore does not receive light from the observed scene except when this light is reflected by the shutter 2 when the latter is in a closed position. The optical viewfinder 3 is preferably in a direction orthogonal to the optical axis 14. This then causes the shutter 2 to be oriented at an angle of  $45^\circ$  with respect to the optical axis 14 as in Figure 1. The optical viewfinder 3 is a viewfinder used for viewing outside the field of the sensors, i.e. it enables vision over a wide field including the useful field which will be the image portion of the observed scene received by the sensors as well as a part of the space surrounding this useful field.

Downline from the objective focal plane 4, there is a spectral splitter 6. The spectral splitter 6 splits the light received from the observed scene into three light components which for example may be red, green and blue. This spectral splitter 6 preferably has several attached prisms with dichroic treatment at the interfaces to geometrically separate the light components. With this spectral splitter 6, three sensors 7, 8 and 9 are associated. Each of the three light components follows a different geometrical path when crossing the spectral splitter 6 to reach one of the three sensors 7 to 9. For the sake of clarity, only the light rays that get focused on the sensor 8 are shown. The optical paths followed by the three light components, between the input of the spectral splitter 6 and the focal planes of the sensors 7 to 9 are also different. The three light components are respectively focused on the sensors 7 to 9. For example, in the preferred case of a splitting into red, green and blue, the red component is focused on the sensor 7, the green component on the sensor 8 and the blue component on the sensor 9.

An adapter 5 located between the objective focal plane 4 and the spectral splitter 6, matches the objective focal plane 4, which is common to all the light components, with the different focal planes of these sensors, in taking account especially of the optical corrections designed to compensate for the aberrations due to the crossing of the spectral splitter 6. Preferably, the geometry of the spectral splitter 6 is such that each sensor is located on

a different axis of a referential system whose original point is inside the spectral splitter 6. For example, in Figure 1, if the axis X designates the optical axis 14, the sensor 8 is on the axis X, namely in the prolongation of the optical axis 14, the sensors 7 and 9 are respectively on the axes Y and Z which are two axes approximately located in a plane orthogonal to the optical axis 14 as in Figure 1.

The sensors 7 to 9 are photoelectric-effect sensors that convert the light components received in their focal plane into electrical signals. These sensors are advantageously matrix sensors, i.e. they consist of a large number of elementary detectors which, all together, cover the useful field of the observed scene. These electrical signals are then conveyed to electronic processing means 10 by means of electrical links. In Figure 1, the electrical links are shown indicated by arrows in dashes, the direction of the arrow indicating the direction of flow of information conveyed by these electrical signals. The processing means 10 process this information before transmitting it to operating means 11 which may for example be either recording means or display means such as a display screen to display the synthesis of the three light components after they pass into the processing means 10. The processing means 10 read the information elements coming from the sensors 7 to 9. This reading is preferably periodic. Generally, the reading period will remain smaller than the switching period of the shutter 2 so that the sensors 7 to 9 illuminated in an open position of the shutter 2 are read before being again illuminated in the next open position of the shutter 2. An open position and a closed position in succession constitute a shutter cycle.

The shutter 2 is controlled by an automatic control device 12 at a given rotational speed, VR for example. The axis of rotation 27 is extended in Figure 1 by dashes up to the automatic control device 12. The preferred shutter 2, described here above, which comprises a rotative element 20, shall be considered throughout the remainder of this document unless otherwise stated. The automatic control device 12 generally comprises a motor driving the rotative element 20 of the shutter 2. In a possible mode of operation of the camera, the automatic control device 12 is driven by the processing means 10. For this purpose, the processing means 10 send a signal to synchronize the reading of the sensors. This synchronization signal

has a frequency  $F$ . The rotational speed  $VR$  is proportional to the frequency  $F$ . The shutter 2 is then synchronized with the reading of the sensors 7 to 9 by the processing means 10. A sensor 13 of the position of the shutter 2 determines the position, with respect to the optical axis 14, of a mirror part of the rotative element of the shutter 2. The camera is designed to adapt to different types of sensors and especially to all types of CCD (charged-coupled device) whether they are interline devices, frame transfer devices, FIT (frame interline transfer) devices etc. It is enough to adjust the different parameters of the camera, namely the shutter cycle, the frequency  $F$ , the rotational speed  $VR$ , etc. to the type of CCD. By way of an example, the configurations of the cameras for interline CCD sensors and frame transfer CCD sensors are given here below. For an optimum synchronization of the shutter 2 with the reading of the sensors 7 to 9, the rotative element may be phase-shifted with respect to the synchronization signal. This enables the precise setting of the instant when a mirror part of the rotative element enters the vicinity of the optical axis 14 as a function of the start of the scanning of the sensors 7 to 9 when they are read, for example in the case of what are called interline CCD sensors, namely sensors whose lines are read directly by scanning. The vicinity of the optical axis 14 is that portion of space, around the optical axis 14, that is illuminated by the light coming from the useful field of the observed scene. In the preferred example of what are called frame transfer sensors, namely sensors (usually CCD sensors) where the entire content is transferred in blocks into a buffer memory before being read, the phase-shift is used to make the passage into the vicinity of the optical axis 14 of a mirror part of the rotative element coincide with the transfer of a frame during the operation of reading the sensors. This passage corresponds to a blind instant for the sensors since the light coming from the useful part of the scene is then concealed.

Figure 2 gives a schematic view of an embodiment of the shutter 2 according to the invention according to the sectional plane AA of Figure 1.

The shutter 2 comprises a rotative element 20 mounted on a rotational axis 27 perpendicular to the plane of Figure 2. The rotative element 20 preferably has several mirror parts separated by aperture parts which are empty parts. Figure 2 shows two mirror parts 21 and 22 and two

aperture parts 23 and 24. The mirror parts are for example made of polished aluminium.

When the mirror parts 21 and 22 pass into the vicinity of the optical axis 14, vicinity having been defined here above as the space around the optical axis illuminated by the light of the useful field of the observed scene, the light coming from this field illuminates the mirror parts 21 and 22 at the first illuminated zones 25. Similarly, the aperture parts 23 and 24 are illuminated, when they pass into the vicinity of the optical axis 14, at the second illuminated zones 26 shown in dashes in Figure 2. Preferably, the first illuminated zones 25 all cover a first angular sector S1 that is substantially identical and the second illuminated zones 26 all cover a second angular sector S2 that is substantially identical. An angular sector S1 that is substantially identical means that this sector S1 is identical for all the zones 25 in the ideal case and that the greater the variation of the sector S1 from one illuminated zone 25 to another illuminated zone 25, the greater is the deterioration in the quality of the image of the observed scene. The same is true for the angular sector S2 with the illuminated zones 26. The ratio between the periods of illumination and the periods of concealment of the sensors corresponds to the ratio S2/S1.

Preferably, the shutter 2 comprises three modes of operation that can be selected by the user: a viewfinder mode corresponding to the fixed rotative element 20 that always has a mirror part 21 (or 22) that intersects the optical axis 14, a video mode corresponding to the fixed rotative element 20 that always has an aperture element 23 (or 24) that intersects the optical axis 14 and a combined mode corresponding to the rotative element 20 in rotation, the mirror parts 21 and 22 intersecting the optical axis 14 in alternation with the aperture parts 23 and 24. The viewfinder mode may be used for localizing. The video mode may be used for recording in conditions of low luminosity. The combined mode may be used by the user to record while at the same time viewing the entire observed scene.

Figure 3 gives a schematic view of another embodiment of the shutter 2 according to the invention along the sectional plane AA of Figure 1.

The shutter 2 has several rotative elements like that of Figure 2. The rotative elements 20 and 30, of which there are advantageously two as in Figure 3, are superimposed and mounted on the same rotational axis 27.

The concealed part of the rotative element 30 is shown in dashes. For the sake of clarity, the illuminated zones are not mentioned here unlike in Figure 2. The rotative element 20 and 30 respectively comprises mirror parts 21 and 22 and 31 and 32 respectively, aperture parts 23 and 24 and 33 and 34 respectively. The mirror parts 31 and 32 preferably cover the same angular sector S1 as the mirror parts 21 and 22. A relative angular offset of the two rotative elements 20 and 30, in such a way that there is partial overlapping between the mirror parts 21 and 31 on the one hand and 22 and 32 on the other hand, is used to make the illumination/darkness ratio of the sensors vary from the value  $S2/S1$ , obtained in Figure 2, to the value  $(S2-S1)/2S1$ . When the value of this ratio becomes smaller than zero, which may occur if  $S1 > S2$ , it simply means that the aperture parts have disappeared by being covered by the mirror parts. The angular offset can advantageously be selected by the user.

### CLAIMS

1. Camera having an optical axis (14) and comprising successively:

- an objective support (1) designed to receive an objective (15);
- a spectral splitter (6) of light into three light components;
- three photoelectric-effect sensors (7-9), each light component being focused on a different sensor, the optical paths between the input of the spectral splitter (6) and the sensors (7 to 9) being different for the three light components;
- electronic means (10) for the processing of information coming from the sensors (7 to 9);

characterized in that the camera also comprises :

- an objective focal plane (4), located between the objective support (1) and the spectral splitter (6), common to all the light components;
- an adapter (5) matching the objective focal plane (4) with the focal planes of the sensors (7 to 9);
- an optical viewfinder (3), outside the field of the sensors (7 to 9), located off the optical axis (14);
- a reflecting shutter (2) located between the objective support (1) and the objective focal plane (4), letting light pass through, in its open position, towards the objective focal plane (4) and orienting the light, in its closed position, towards the viewfinder (3).

2. Video camera according to claim 1, characterized in that the camera comprises at least one mode in which the shutter (2) periodically switches between the closed and the open positions and in that its switching period is smaller than the duration of the retinal persistence.

3. Camera according to any of the claims 1 to 2, characterized in that the shutter (2) comprises at least one rotative element (20, 30) comprising at least one mirror part



CLAIMS

1. Camera having an optical axis (14) and comprising successively:

- 5       - a shutter (2);
- an objective focal plane (4);
- an adapter (5);
- a spectral splitter (6) of light into three light components;
- 10      - three photoelectric-effect sensors (7 to 9), each light component being focused on a different sensor;
- electronic means (10) for the processing of information coming from the sensors (7 to 9);

15      the objective focal plane (4) being common to all the light components, and the adapter (5) matching the objective focal plane (4) with the focal planes of the sensors (7 to 9);

characterized in that the camera also comprises :

- 20      - an objective support (1) that is designed to receive an objective (15) and is located upline from the shutter (2);
- an optical viewfinder (3), outside the field of the sensors (7 to 9), located off the optical axis (14);

in that the optical paths between the input of the spectral splitter (6) and the sensors (7 to 9) are different for the three light components;

25      and in that the shutter (2) is reflecting, letting light pass through, in its open position, towards the objective focal plane (4) and orienting the light, in its closed position, towards the viewfinder (3).

2. Video camera according to claim 1, characterized in that the camera comprises at least one mode in which the shutter (2) periodically switches between the closed and the open positions and in that its switching period is smaller than the duration of the retinal persistence.

30      3. Camera according to any of the claims 1 to 2, characterized in that the shutter (2) comprises at least one rotational element (20, 30) comprising at least one mirror part

(21, 22, 31, 32) corresponding to its closed position and at least one aperture part (23, 24, 33, 34) corresponding to its open position.

5 4. Camera according to claim 3, characterized in that the camera comprises an automatic control device (12) for the rotative element (20, 30) at a speed of rotation (VR) proportional to the frequency (F) of a signal given by the processing means (10) to the automatic control device (12), the signal being a synchronization signal for the reading of the  
10 sensors (7 to 9) by the processing means (10), and in that the camera comprises a sensor (13) of the position of the rotative element, the position sensor (13) and the automatic control device (12) enabling the rotative element (20, 30) to be phase-shifted with respect to the synchronization signal.

15 5. Camera according to claim 4, characterized in that the sensors (7 to 9) are frame transfer sensors.

6. Camera according to any of the claims 3 to 5, characterized in that the shutter (2) comprises three modes that can be selected by the user : a viewfinder mode corresponding to a fixed rotative element (20, 30) that always has a mirror part (21, 22, 31, 32) that intersects the optical axis (14); a video  
20 mode corresponding to a rotative element (20, 30) that always has an aperture part (31, 32, 33, 34) that intersects the optical axis (14); and a combined mode corresponding to the rotative element (20, 30) in rotation.  
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7. Camera according to any of the claims 3 to 6, characterized in that rotative element (20, 30) comprises at least two mirror parts (21 and 22, 31 and 32) and at least two aperture parts (23 and 24, 33 and 34), and in that, in the vicinity of the optical axis (14), the mirror parts (21 and 22, 31  
30 and 32) all cover a first angular sector (S1) that is substantially identical and the aperture parts (23 and 24, 33 and 34) all cover a second angular sector (S2) that is substantially identical.

8. Camera according to claim 7, characterized in that the shutter (2) comprises at least two rotative elements (20 et 30) having the same axis (27) of rotation, that are superimposed and can be offset by an angular offset such that the mirror parts (21 and 31, 22 and 32) of rotative elements (20 and 30) overlap at least partially.

9. Camera according to claim 8, characterized in that the offset can be selected by the user.

10. Camera according to any of the claims 1 to 9, characterized in that the camera comprises a screen (11) to view the synthesis of the different light components after their passage into the processing means (10).

## ABSTRACT

## VIDEO/FILM CAMERA

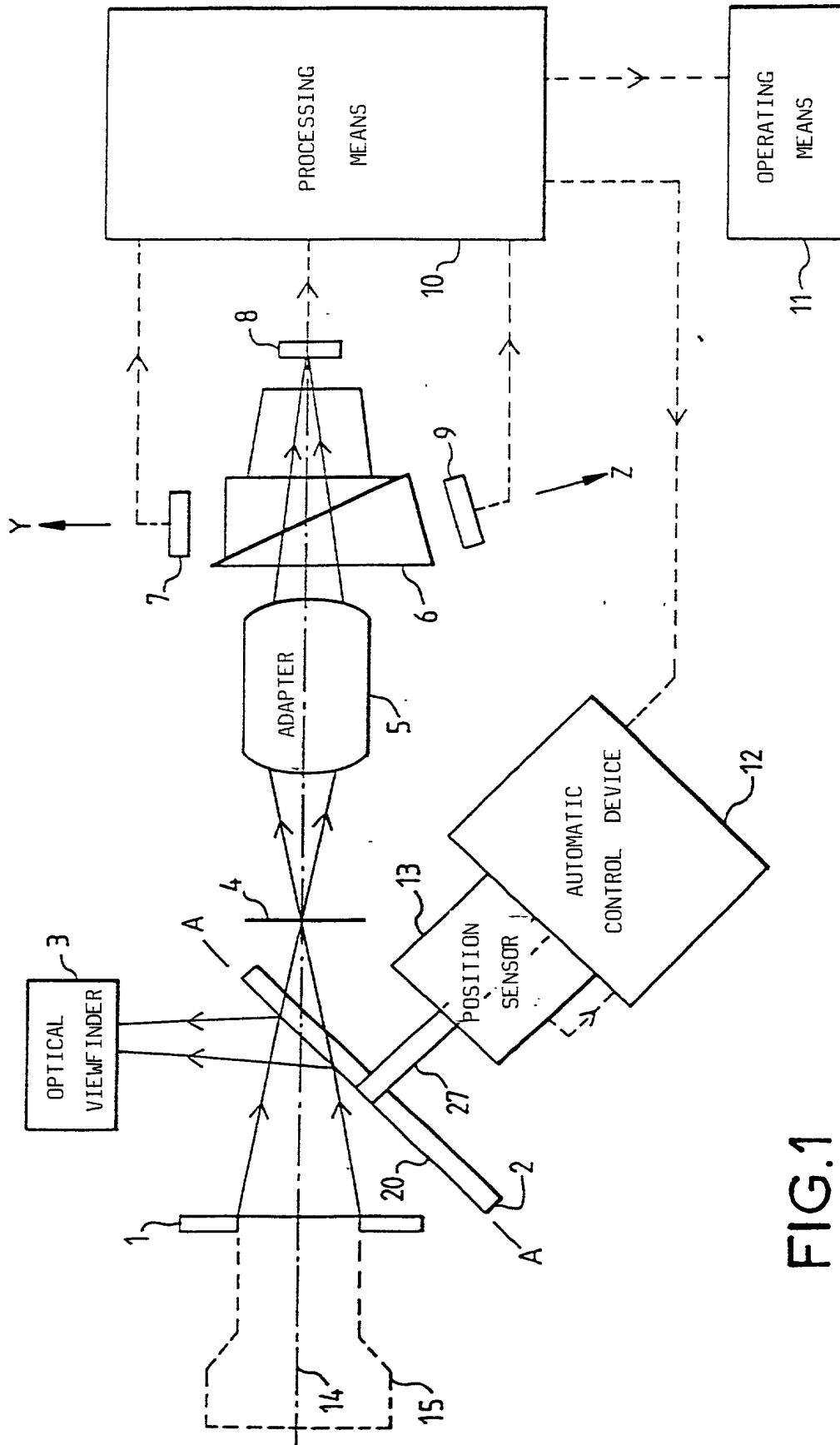
5 The invention relates to the field of cameras.

This is a camera having an optical axis (14) and comprising successively: an objective support (1) designed to receive an objective (15); a reflecting shutter (2) letting light pass through, in its open position, towards an objective focal plane (4) and orienting the light, in its closed position, towards a viewfinder (3); the objective focal plane (4) being common to all the light components of the light coming from the observed scene; an adapter (5) matching the objective focal plane (4) with the focal planes of the sensors (7 to 9); a spectral splitter (6) of light into three light components; three photoelectric-effect sensors (7-9), each light component being focused on a different sensor, the optical paths between the input of the spectral splitter (6) and the sensors (7 to 9) being different for the three light components; the camera also comprises: electronic means (10) for the processing of the information coming from the sensors (7 to 9); an optical viewfinder (3), outside the field of the sensors (7 to 9), located off the optical axis (14).

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15  
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Fig. 1.

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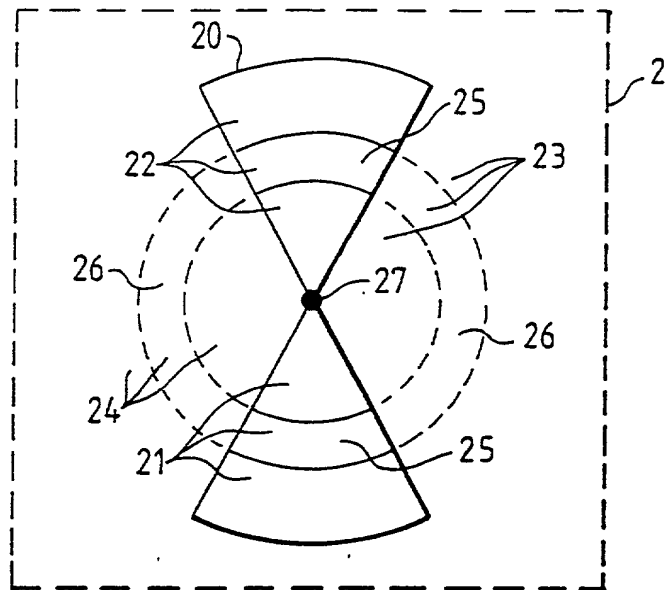


FIG. 2

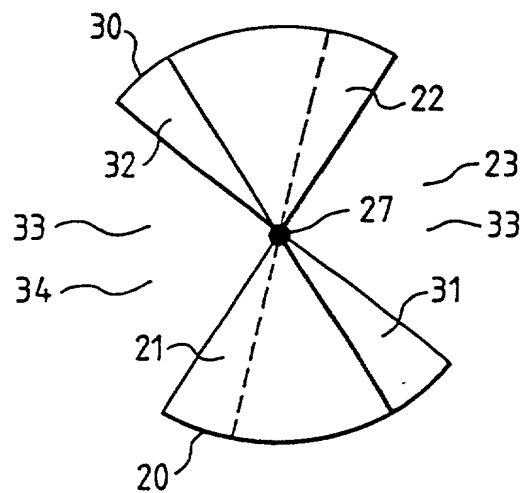


FIG. 3

# Declaration and Power of Attorney for Patent Application Déclaration et Pouvoirs pour Demande de Brevet

## French Language Declaration

En tant l'inventeur nommé ci-après, je déclare par le présent acte que.

As a below named inventor, I hereby declare that:

Mon domicile, mon adresse postale et ma nationalité sont ceux figurant ci-dessous à côté de mon nom.

My residence, post office address and citizenship are as stated next to my name.

Je crois être le premier inventeur original et unique (si un seul nom est mentionné ci-dessous), ou l'un des premiers co-inventeurs originaux (si plusieurs noms sont mentionnés ci-dessous) de l'objet revendiqué, pour lequel une demande de brevet a été déposée concernant l'invention intitulée

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

VIDEO/FILM CAMERA

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

et dont la description est fournie ci-joint à moins

the specification of which

☐ ci-joint

☐ is attached hereto.

☐ a été déposée le \_\_\_\_\_

☒ was filed on 3 September 1999

sous le numéro de demande des Etats-Unis ou le  
numéro de demande international PCT

as United States Application Number or PCT  
International Application Number

\_\_\_\_\_ et modifiée le

PCT/FR99/02111 and was amended on

\_\_\_\_\_ (le cas échéant)

\_\_\_\_\_ (if applicable).

Je déclare par le présent acte avoir passé en revue et compris le contenu de la description ci-dessus, revendications comprises, telles que modifiées par toute modification dont il aura été fait référence ci-dessus.

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

Je reconnais devoir divulguer toute information pertinente à la brevetabilité, comme défini dans le Titre 37, § 1.56 du Code fédéral des réglementations

I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, § 1.56

## French Language Declaration

Je revendique par le présent acte avoir la priorité étrangère, en vertu du Titre 35, § 119(a)-(d) ou § 365(b) du Code des Etats-Unis, sur toute demande étrangère de brevet ou certificat d'inventeur ou, en vertu du Titre 35, § 365(a) du même Code, sur toute demande internationale PCT désignant au moins un pays autre que les Etats-Unis et figurant ci-dessous et, en cochant la case, j'ai aussi indiqué ci-dessous toute demande étrangère de brevet, tout certificat d'inventeur ou toute demande internationale PCT ayant une date de dépôt précédant celle de la demande à propos de laquelle une priorité est revendiquée.

I hereby claim foreign priority under Title 35, United States Code, § 119(a)-(d) or § 365(b) of any foreign application(s) for patent or inventor's certificate, or § 365(a) of any PCT International application which designated at least one country other than the United States, listed below, and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or PCT International application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application(s)  
Demande(s) de brevet antérieure(s) dans un autre pays

Priority claimed  
Droit de priorité  
revendiqué

98 11199      FRANCE  
(Number)      (Country)  
(Numéro)      (Pays)

8 SEPTEMBER 1998  
(Day/Month/Year Filed)  
(Jour/Mois/Année de dépôt)

☒ ☐  
Yes      No  
Oui      Non

\_\_\_\_\_  
(Number)      (Country)  
(Numéro)      (Pays)

\_\_\_\_\_  
(Day/Month/Year Filed)  
(Jour/Mois/Année de dépôt)

☐ ☐  
Yes      No  
Oui      Non

Je revendique par le présent acte tout bénéfice, en vertu du Titre 35, § 119(e) du Code des Etats-Unis, de toute demande de brevet provisoire effectuée aux Etats-Unis et figurant ci-dessous

I hereby claim the benefit under Title 35, United States Code, § 119(e) of any United States provisional application(s) listed below

\_\_\_\_\_  
(Application No.)      (Filing Date)  
(N° de demande)      (Date de dépôt)

\_\_\_\_\_  
(Application No.)      (Filing Date)  
(N° de demande)      (Date de dépôt)

Je revendique par le présent acte tout bénéfice, en vertu du Titre 35, § 120 du Code des Etats-Unis, de toute demande de brevet effectuée aux Etats-Unis, ou en vertu du Titre 35, § 365(c) du même Code, de toute demande internationale PCT désignant les Etats-Unis et figurant ci-dessous et, dans la mesure où l'objet de chacune des revendications de cette demande de brevet n'est pas divulgué dans la demande antérieure américaine ou internationale PCT, en vertu des dispositions du premier paragraphe du Titre 35, § 112 du Code des Etats-Unis, je reconnais devoir divulguer toute information pertinente à la brevetabilité, comme défini dans le Titre 37, § 1.56 du Code fédéral des réglementations, dont j'ai pu disposer entre la date de dépôt de la demande antérieure et la date de dépôt de la demande nationale ou internationale PCT de la présente demande

I hereby claim the benefit under Title 35, United States Code, § 120 of any United States application(s), or § 365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of Title 35, United States Code, § 112, I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, § 1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application

PCT/FR99/02111      3 SEPTEMBER 1999  
(Application No.)      (Filing Date)  
(N° de demande)      (Date de dépôt)

\_\_\_\_\_  
(Status) (patented, pending, abandoned)  
(Statut) (breveté, en cours d'examen, abandonné)

\_\_\_\_\_  
(Application No.)      (Filing Date)  
(N° de demande)      (Date de dépôt)

\_\_\_\_\_  
(Status) (patented, pending, abandoned)  
(Statut) (breveté, en cours d'examen, abandonné)

Je déclare par le présent acte que toute déclaration ci-incluse est, à ma connaissance, véridique et que toute déclaration formulée à partir de renseignements ou de suppositions est tenue pour véridique, et de plus, que toutes ces déclarations ont été formulées en sachant que toute fausse déclaration volontaire ou son équivalent est passible d'une amende ou d'une incarcération, ou des deux, en vertu de la Section 1001 du Titre 18 du Code des Etats-Unis, et que de telles déclarations volontairement fausses risquent de compromettre la validité de la demande de brevet ou du brevet délivré à partir de celle-ci

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon



## French Language Declaration

**POUVOIRS:** En tant que l'inventeur cité, je désigne par la présente l'(les) avocat(s) et/ou agent(s) suivant(s) pour qu'ils poursuive(nt) la procédure de cette demande de brevet et traite(nt) toute affaire s'y rapportant avec l'Office des brevets et des marques: (mentionner le nom et le numéro d'enregistrement).

**POWER OF ATTORNEY:** As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith: (list name and registration number)

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Nom complet de l'unique <del>co-inventeur</del> inventeur		Full name of sole or first inventor	
<u>Patrick DEFAY</u>			
Signature de l'inventeur	Date	Inventor's signature	Date
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Signature de l'inventeur	Date	Second inventor's signature	Date
Domicile		Residence	
Nationalité		Citizenship	
Adresse Postale		Post Office Address	

(Fournir les mêmes renseignements et la signature de tout co-inventeur supplémentaire.)

(Supply similar information and signature for third and subsequent joint inventors.)